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SCIENCE NEWS LETTER

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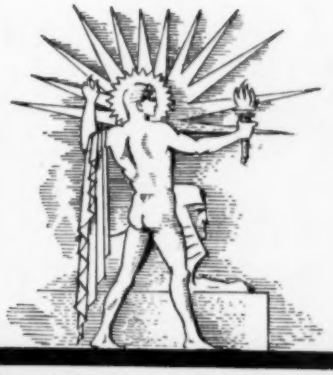
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



July 4, 1942

Spirit of '42

See Page 11

A SCIENCE SERVICE PUBLICATION

Do You Know?

Alfalfa contains large quantities of vitamin K.

Birds have a higher body temperature than other living organisms.

Seven minutes is the longest possible time for an *eclipse* of the sun.

Pork products represent about 10% of the food dollar spent by American consumers.

Top-soil from skeet-shooting grounds in several states is being worked, to reclaim *lead shot.*

Blood plasma transfusions can be given directly on the battlefields, and blood typing or matching is unnecessary.

If *perspiration* stains have affected the color of a garment, fumes from an ammonia bottle may restore the original shade.

Lawns should be cut not closer than 1½ inches since grass, like all other plants, depends on its leaves for food to produce roots.

The insecticide *hellebore,* commonly supposed to be harmless, is actually poisonous, but in small quantities it becomes harmless when exposed to weather for ten days or so.

A recently patented *"scriptoscope"* projects writing or diagrams, made on cellophane, from a desk-top lens onto a screen, enabling a teacher to illustrate his lecture while seated at his desk.

Question Box

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Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

GENERAL SCIENCE

Why You Should Buy U. S. War Bonds and Stamps

THOUSANDS of scientists and millions of dollars are being used to back up our war effort with science. In order that our army, navy and air force may be victorious in battle, they must have the essential mechanisms and methods that only scientific research can give. Your purchase of war bonds will support this essential work. Buying bonds is a better way to show patriotism than too many Fourth of July speeches and too much flag waving.

Science News Letter, July 4, 1942

SCIENCE NEWS LETTER

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PHYSICS—ENGINEERING

Electrons Time Lightning And Paint Its Portrait

Sweeping Across a Photographic Film at Speeds Up to 18,000 Miles Per Second, Beam Pictures Flash

A BEAM of electrons sweeping back and forth across a photographic film at speeds up to 18,000 miles per second, a tenth that of light, times a lightning flash to a few billionths of a second, measures the current and voltages, and draws a picture of the oscillations.

This is the ultra-fast oscillograph described by E. J. Wade, T. J. Carpenter, and D. D. MacCarthy, all of the General Electric Company, Pittsfield, Mass., at the meeting of the American Institute of Electrical Engineers in Chicago.

The instrument was developed for research on lightning arresters to determine the duration, intensity and character of the electric surges that occur when the arrester is struck by lightning. Artificial lightning was used.

One film showed a flash which died away in about a ten-millionth of a second. During that time, however, 11.3 oscillations occurred. Thus the electron beam swept back and forth this number of times across the film or at the rate of 113 million times a second, and attained a maximum "writing speed" of 18,000 miles a second.

The instrument, a veritable time-microscope, can of course be used in any other cases where "transients" or electrical actions of exceedingly short duration are involved. The ordinary oscillograph is used in television, in determining the wave forms of alternating currents and in many electronic devices. It has even been used in geophysical prospecting for oil.

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This announcement was made by F. K. McCune and J. H. Goss, both of the General Electrical Company at Lynn, Mass., at the meeting of the American Institute of Electrical Engineers.

Jewels are essential because the moving systems of these miniature instruments are of watch size and delicacy. Indeed, with the hairspring frequently used to restore the pointer to zero, the system looks much like the balance wheel of a fine watch. An extraordinarily small amount of power is required to move the system. Thus the power consumed by a 40-watt lamp would run 1,000,000 instruments, and even 100,000,000 of the most sensitive ones.

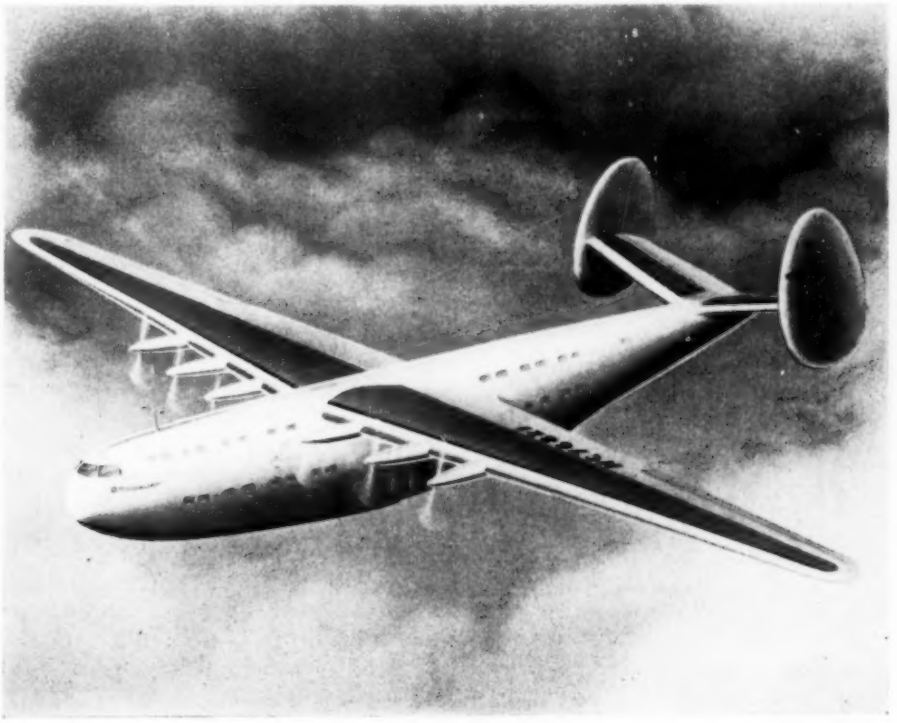
Twenty-five years ago the General Electric Company used hard glass bearings for its small instruments and continued to do so for several years. But with the introduction in Europe, principally in Switzerland, of the synthetic sapphire, identical in composition with the natural stone, the glass bearings were abandoned. When the sapphires were cut off the company again explored the possibilities of the hard glass bearing.

Several advantages are claimed for it. The bearing must be very accurately shaped to prevent all but the minutest side and end play. The bottom of the V-shaped depression in which the pivot rests must be accurately spherical in shape, with a radius of three to four thousandths of an inch. This was very difficult to accomplish with the hard sapphire, but there is no such difficulty with the glass.

Even the inferior hardness of the glass is claimed an advantage. It is of about the same hardness as the steel

Replaces Swiss Sapphire

SWISS sapphires for the pivot bearings of small electrical instruments have been cut off by the war just at the time when our armed forces and war industries need millions of these instruments. A substitute jewel has been developed, composed of a special hard glass, which has been found by many tests to be satisfactory. Mass production of the new jewels has already begun.



HONORED

For this design for a 250,000-pound flying ship and for the 140,000-pound Mars, now largest flying boat in the world, Glenn L. Martin won the American Design Award. This new ship, if built, would be able, it is stated, to carry 102 passengers, each with 80 pounds of baggage plus 25,000 pounds of mail and cargo. It could make the trip to London in 13 hours. As military transports, Mr. Martin said, such ships would be able to carry large numbers of troops and heavy supplies.

pivot. If the instrument is dropped both will be equally injured, and this may affect the performance of the instrument but little. In a similar accident with a sapphire bearing the pivot takes the whole punishment. The point is mushroomed and the needle sticks.

But in any case, the lack of European sapphires will not hold up the production of such fine mechanisms as delicate measuring instruments for radio, radiolocators, and electronic control devices for the panel boards of airplanes.

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MEDICINE

Regression of Breast Cancer Follows Sex Gland Operation

REGRESSION of an inoperable breast cancer that had spread to the bones and relief of persistent, troublesome pain in the bones and healing of the cancerous areas in the bones followed a desexing operation (castration) in a 72-year-old man, Dr. Joseph H. Farrow and Dr. Frank E. Adair, of Memorial Hospital, New York City report (*Science*, June 26).

It is only four months since the operation and the case is not reported as a cure for cancer, but the doctors state:

"Control of disease as extensive as that observed in Case II is unusual. It may be unassociated with the operative procedure employed, although this appears improbable."

Case I, also a man with breast cancer that had spread to the bones, was given a different type of treatment, consisting of injections of male sex hormones. This treatment not only failed to halt the progress of the cancer but seemed to speed the activity of the cancer both in this patient and in three women to whom the same treatment had been given.

The two types of treatment were tried because of evidence from earlier studies. These suggested that patients with breast cancer might have a defect in body chemistry which would change the sex hormones in the body into another chemical. This second chemical might be able to weaken the bones, making them ready prey to the spreading cancer, or might stimulate the growth of cancer that had spread to the bones. A systematic study is now in progress to learn the effect of upsetting the sex hormone balance on the course of inoperable, spreading breast cancer. From such studies, it is hoped, may come knowledge of how to control this kind of cancer.

Science News Letter, July 4, 1942

MEDICINE

First Commercial Production Of Spotted Fever Vaccine

A VACCINE to protect against dangerous Rocky Mountain spotted fever and a promising serum for treatment of people sick with the disease are now being produced by Lederle Laboratories, Inc.

The Lederle Laboratories is the first commercial organization to apply for and receive a license from the U. S. Public Health Service to make the vaccine. Hitherto it has been available only as produced at the federal health service's laboratory at Hamilton, Mont.

The Lederle vaccine is made from chick embryo by the yolk sac method devised by Dr. Herald N. Cox, U. S. Public Health Service. This vaccine was used extensively by the federal health service during 1941 with results as good as those obtained with the earlier vaccine developed by the U. S. Public Health Service, which was made from infected ticks. The tick vaccine, according to earlier reports, protected all but 64 out of 15,000 vaccinated persons in Rocky Mountain spotted fever regions.

One other firm (Sharp and Dohme) is also making the serum for treatment of Rocky Mountain spotted fever. The National Institute of Health in Washington, D. C., has a limited quantity of serum for treatment of suitably selected cases from which to judge further the value of the serum. Evidence from laboratory studies and a limited number of human cases so far treated is good.

Rocky Mountain spotted fever, although first discovered in the Rocky Mountain states, has now been reported from all but the five New England states and two states in the north central region. About 75 cases each occur in Maryland and Virginia each year, with a 20% mortality.

A total of 147 cases for the entire nation have been reported to the U. S. Public Health Service in Washington so far this year, with the usual increase in numbers in late spring and early summer. For the week ending June 13, there were 26 cases, of which 16 were in the Rocky Mountain states and the rest were in Maryland, Virginia, North Carolina, New Jersey and Illinois. The disease is spread by ticks.

Science News Letter, July 4, 1942

NUTRITION

Food to Assure Reasonably Adequate Diet Through 1943

"THERE will certainly be enough food to assure everyone of a reasonably adequate diet through the rest of this year and 1943," Oris V. Wells, of the U. S. Bureau of Agricultural Economics, told members of the American Home Economics Association at their meeting in Boston.

This would be true, he said, in spite of the fact that American farmers are faced with the "difficult task" of producing enough food to "maintain domestic food consumption at about its average level in the United States as well as to supply the quantities of several foods that are needed for lend-lease shipment."

We here in the United States have been eating about the same total amount of food each year since 1909, Mr. Wells said, although we have made several significant shifts within the total amount.

We eat fewer potatoes and less of cereal products, especially flour and cornmeal. We have been eating more sugar, increasing our consumption of this chiefly between 1920 and 1925. We have been eating about the same amounts of eggs, butter and meat each year, but have been taking more condensed milk, ice cream and cheese, and following World War I we began to drink more fluid milk and cream.

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MEDICINE

Artery Hardening Comes Early In Men Who Climb Stairs

Apparently Produces More Artery Hardening Than Do Standing, Sitting or Walking in Men Over 40 Years

HARDENING of the arteries of the legs as a result of occupational stress and stain affects more men than women and develops earlier in men who climb stairs than in men who do not.

This finding is part of a study which may have military significance in connection with mobilization of men over 40 years and the necessity of manning and fighting from bases at extremely frigid temperatures such as Alaska and Iceland. The study is reported by Dr. Michael Lake, Dr. Gerald H. Pratt and Dr. Irving S. Wright, of New York (*Journal, American Medical Association,* June 27).

The use of alcohol and tobacco had no effect on the development of artery hardening in the 536 persons studied. These were men and women over 40 years of age, department store employees who had for 10 or more years worked predominantly at jobs requiring four different kinds of strain, or lack of it, on the arteries of legs. These jobs either were sitting jobs, such as typing and clerical work; standing jobs, such as operating elevators and selling behind counters; walking, such as furniture salesmen, cleaning women, porters and special policemen do; and stair climbing, such as delivery men "and other persons climbing stairs most of the time" do.

Object of the study was to find whether prolonged stress and strain leads, as one popular theory has it, to hardening of the arteries. Other conclusions: While stair climbing apparently produced more artery hardening than standing, sitting or walking among men 40 to 49 years of age, over the age of 50 there was no significant difference in the amount of artery disease in any of these classifications. Among both sexes there was a definite relation between the incidence of high blood pressure and artery hardening of the legs. Varicose veins were found more often among women than men, even when the women who had had babies were excluded, and more often among women who stood or walked than among those who sat at their work.

Science News Letter, July 4, 1942

DEDICATED TO SCIENCE

This new $5,000,000-building is Northwestern University's Technological Institute, recently formally dedicated. An artificial river for testing boat models and wave action and a huge hydraulic press are among the unusual installations.

PHYSIOLOGY

Vitamin Lack Causes Loss of Feather Color

VITAMIN lack can cause color loss in feathers just as it causes color loss in hair, experiments by Thomas C. Groody and Mary E. Groody at the University of California indicate (*Science,* June 26).

The two researchers placed a number of black Minorca chicks on a vitamin-free diet, supplementing it with varying doses of the necessary vitamins, except that to one group they gave no pantothenic acid, and to another only a minimum amount of this member of the vitamin B complex.

The no-pantothenic chicks developed colorless, often distorted feathers, while those with inadequate doses of the vitamin had colored feathers with a rather "washed-out" appearance.

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CHEMISTRY

Training for Peace Present Duty of Education

FOUR to seven years study and training in pure chemistry are necessary before a man can turn his hand to technological applications. It is the duty of educational institutions to provide this training to insure a supply of trained men for the future.

This was the message of Dr. Roger Adams, chairman of the department of chemistry of the University of Illinois, at the dedication of Northwestern University's new Technological Institute.

The progress of science will be somewhat deterred by its present diversion almost entirely to defense problems, Dr. Adams continued. But it is bound to continue to live and prosper regardless of present handicaps. He saw in the new $5,000,000 Institute with its $1,000,000 scientific equipment, a major contribution to the facilities for instruction and research in chemistry, physics, and engineering in the United States.

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CHEMISTRY

Chemical Riches From Oil

Not Just Fuel, Oil and Natural Gas Also Yield Explosives, Drugs, Fertilizers and Plastics for War

By DR. FRANK THONE

OIL, natural gas, to most of us denote simply fuel. Used all our lives to thinking in terms of the car on the road, the range in the kitchen, the furnace in the basement, we go on thinking now in terms of planes roaring through the air, tanks charging across the battlefield, industrial furnaces flaming along the whole broad home front to keep the fighting forces well supplied.

But that is far from being the whole story of the usefulness of these gifts of the deep earth, in this time of all-out national effort toward victory over the would-be world looters who have attacked us. Under the generalship of scientists, oil and natural gas have been deployed into a hundred positions where they contribute mightily in the production of explosives, medical materials, raw-stuffs for industry, fertilizers for the increase of the food supply. They are not merely fuels, they are protean chemicals, doing the thousand things that have long since become traditional tasks of coal tar derivatives.

It would be impossible to review all the chemical magics now being wrought with oil and natural gas in anything less than a thick book. Suppose we confine ourselves to a quick look at just a couple of plants where petroleum goes in at one end and chemical products come out at the other.

Outstanding Plants

The two plants chosen for present purposes are among the establishments belonging to the Shell Chemical Company, one of the firms of the well-known oil concern. Both are in California, one at Shell Point, on the northern shore of San Francisco Bay, the other near Wilmington in the Los Angeles area. These are outstanding, yet typical of what great advances and wide departures from tradition have been made by what was once known as "oil chemistry."

The northern plant has as its main objective the manufacture of ammonia, old familiar strong-smelling stuff that fumed out of the household ammonia-water bottle, but grown now into one of the most potent of all the genii of wartime chemical industry.

Ammonia, before it is combined with water to make ammonia-water, is a very simple chemical compound. Represented by the chemical formula NH_3, it is composed of one part of nitrogen, three parts of hydrogen.

At the Shell Point plant, the raw materials used are ordinary air (oxygen and nitrogen) and a natural gas piped in from a number of gas fields in the region. This gas consists mainly of methane (CH_4), made up one part of carbon and four of hydrogen. The job is to take nitrogen from the air and hydrogen from the gas and combine them in the right proportions to make ammonia.

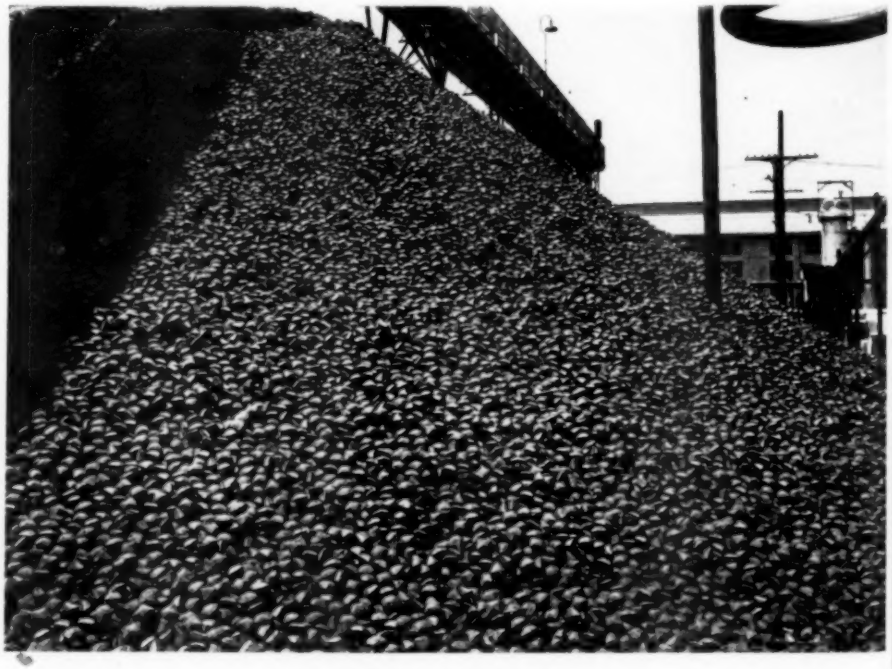
Cracking, First Step

The first step is to crack the gas. Cracking, in oil-chemical parlance, means running it through a tall tower filled with red-hot bricks. The heat rends the chemical bonds holding carbon and hydrogen atoms together, lets them both flow free. The carbon is washed out with water—we'll take a look at it later. The hydrogen still has a lot of gases mixed with it, which are also removed through several stages of purification processes, either to be run through the cracking tower again or to be sidetracked for marketing to other oil or chemical industries.

In the meantime, pure nitrogen has been manufactured in another part of the plant by compressing and chilling air until it has become liquid air, then letting the nitrogen boil off—it has a lower boiling point than liquid oxygen, which is left behind.

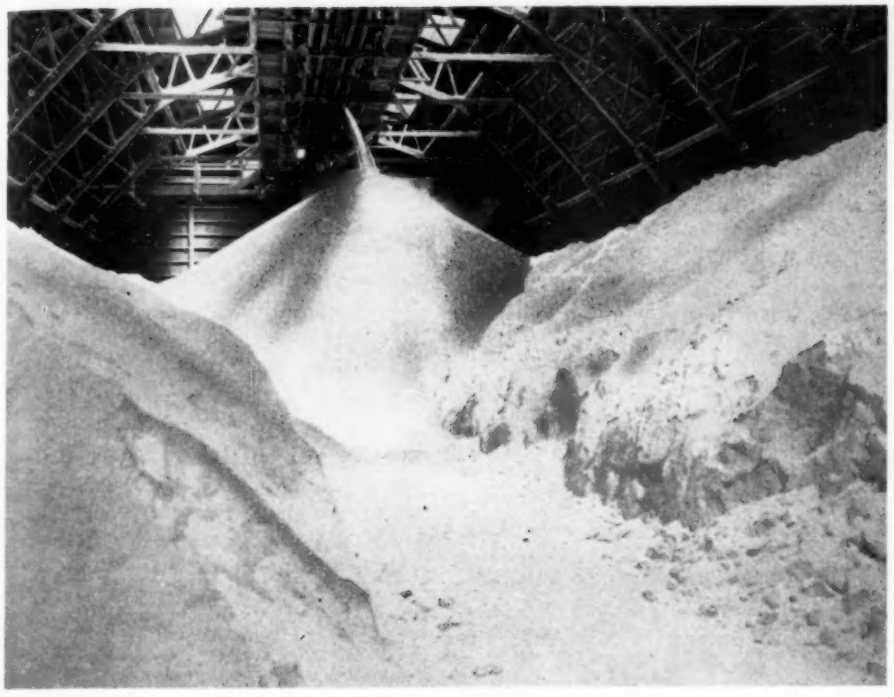
Purified hydrogen and nitrogen are then passed over a catalyst where they react to form ammonia (NH_3). As ammonia, the compound may be marketed as a gas compressed down to liquid state, or dissolved to make ammonia-water, or combined with sulfuric acid to make ammonium sulfate, a favorite fertilizer chemical.

Biggest market at present is the U. S. Government. Ammonia can be converted into nitric acid, which is then combined



FOR STEEL MAKING

Carbon from natural gas is briquetted to be used in making ultra-high quality steel.



FOR CROPS AND DESTRUCTION

From natural gas and air is made the fertilizer, ammonium sulfate, and the same processes that give chemicals for tastier truck crops, finer fruits and greener lawns, produce ammonia, basic stuff for TNT, amatol, high explosives for war.

with toluol (another product of the oil industry) to make TNT, or with cellulose to make guncotton, or with glycerin to make nitroglycerin. Nitric acid can also be hooked up with ammonia to make ammonium nitrate, which is then mixed with TNT, and under the convenience-name amatol is one of the best high explosives for bombs.

The carbon which we saw departing in the clutches of water, a moment ago, is precipitated out and dried. The finer particles are marketed as carbon black, one of the principal fillers used in the rubber industry. It is what makes black rubber black. The coarser part of the carbon (still pretty fine) is pressed into briquets and sold to metallurgists who eagerly take all they can get for the manufacture of ultra-high quality steel.

Alcohol, Too

From natural gas to ammonia, fertilizer, explosives, carbon for steel, is thus a radical but perfectly natural series of transformations. It is paralleled at the other plant, in southern California, where the lighter fractions of earth-oil become two kinds of alcohol, and these in turn become solvents, plastics, safety glass, even tear gas.

Two of the light constituents found in the gases obtained from refinery cracking operations are propylene and butylene. These are reactive hydrocarbons and are capable of being converted into alcohols. Propylene forms isopropyl alcohol which, in addition to being able to replace ethyl alcohol for many purposes, can be changed into acetone, a basic material used in the preparation of certain kinds of rayon, safety glass, photographic films, synthetic resins and tear gas. With the deadly gas, hydrocyanic acid, acetone goes into the making of the beautiful, glass-clear, familiar plastic known as Lucite, now being pressed into service for the "greenhouses" and gun turrets of our bombers.

At the present time a most important wartime application of acetone is in the manufacture of smokeless powder for which purpose large quantities are used.

Butylene, in a similar manner, is converted into butyl alcohol and methyl ethyl ketone. The latter compound is used extensively in the de-waxing of lubricating oils, in making lacquers and artificial leather and as a solvent in applying many resins and plastics in their finished forms.

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ENGINEERING

Wind Tunnel Has Huge Induction Motor

A 40,000-HORSEPOWER electric induction motor drives air through the great wind tunnel at Wright Field. Not only is it the largest beast of its kind, but also the best tamed.

It is part of a large group of powerful machines required for the proper operation of the tunnel. Among these are a 38,000-horsepower motor-generator set, another of around 8,000 horsepower, a 400-horsepower exciter set, 6,900-volt and 460-volt switch gear, great cooling fans, oil circulation pumps, electronic control apparatus and other instruments.

The fine speed regulation of the great motor, the harmonious coordination and control of all the rest of the machinery, and safety of operation, are the problems discussed by Robert R. Longwell and M. E. Reagan of the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa., at the meeting of the American Institute of Electrical Engineers in Chicago.

The operation and control are as far as possible automatic. A few manual operations are required to start the auxiliary machinery. When this is smoothly running, the operator merely sets a pointer on a dial to the desired speed. Automatically the oil pumps are started, switches are thrown, control apparatus brought into play, and the great motor is brought gradually and smoothly up to the desired speed and then held there by electronic control.

To change the speed, the operator simply moves the pointer up or down. To stop the motor, he moves the pointer back to zero.

During an airplane test, the speed is maintained constant to within 0.3% to 0.5%.

One reason for describing this installation, the engineers said, was that the same principles can be applied wherever large powers must be very accurately controlled, or many machines must be coordinated to do their proper tasks at the proper times. Thus the engineers cooperate also in helping each other.

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Visits by parents and handling of babies by nurses and interns are encouraged at one large hospital, to help overcome the *loneliness* which infants ordinarily experience from being left alone too much.

CHEMISTRY

Cannot Predict Sweetening Of Sugar Substitutes

WHEN the housewife uses a sugar substitute for part or all of the ordinary sugar called for in a cake, there is no general rule for predicting whether the finished cake will be more or less sweet than it would have been in pre-sugar rationing days.

The reason is that the relative sweetening values of sugars vary with their concentration, Miss Edith H. Nason, of Syracuse University, told members of the American Home Economics Association meeting in Boston.

When one sugar is added to another, the sweetness is not additive, Miss Nason said.

Acids as well as sugar act as preservatives for foods, she continued. Glucose, the sugar found in corn syrup, has a more lethal effect on yeasts and bacteria than ordinary sugar. The nature of the anion as well as the number of hydrogen ions has importance in determining the protective action of acids.

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AERONAUTICS

Merit Cards To Be Issued For Making Airplane Models

"NO EFFORT is too small; no achievement, too great" when it comes to furnishing model airplanes for use by the U. S. Army Air Force, First Fighter Command.

The call has gone out nation-wide for model planes which will be utilized in more than 9,000 Observation Posts along the Atlantic seacoast from Maine to Florida.

An official certificate bearing the signature of Brig. Gen. J. K. Cannon, U. S. Army, commanding the First Fighter Command, will be issued to every person who makes a "quota" of four acceptable models. This certificate of award reads, "This is to certify that———— has been awarded the honorary rank of Aircraft Technician in recognition of wartime service in making Four Scale Model Aircraft for use by the Ground Observer Corps in accordance with specifications approved by the Army Air Force.

"Given this —— day of —— in the year of Our Lord one thousand nine hundred and forty-two and of the Independence of the United States one hundred and sixty-six."

Further to encourage this educational program, a merit award card is to be issued to every person who contributes even as much as a single acceptable model. Space is provided for the name of the model builder and the school science club, boys club, scout group or other organization with which he chooses to have his affiliation known.

Four such cards issued to the same person indicating that he or she has made a "quota" of four models will be exchanged for the Army's certificate of award. A complete quota comprises one single-motored, one bi-motored and one multi-motored ship and a biplane. Seven sets of plans are sent to those volunteering their services. From these selection can be made by the model builder.

Science Clubs of America at 310 Fifth Avenue, New York, N. Y., has been designated officially as the "clearing house" from whence all illustrative material, instructions and other literature will be sent without charge. All airplane models must be sent to that organization. From that point the Army will distribute models to the observation posts. They should not be sent direct to the Army.

As rapidly as possible diagrams and instructions are being sent to those who have volunteered to help build the needed scale models. Many clubs devoted to scientific pursuits are modifying their programs so that model making can be included in their activities.

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ENGINEERING

War-Time Fire Hose Contains Less Rubber

A NEW war-time fire hose, which uses only seven pounds of new rubber instead of 17 pounds for 100 feet in the 2½ inch size, stands up under the standard test applied by Underwriters' Laboratories. It probably will not last as long.

The bursting pressure for the double-jacketed hose still remains 600 pounds per square inch.

When the order reducing the rubber content of fire hose was issued earlier this year by the War Production Board, fire chiefs found that they could not obtain such hose because it did not meet the Underwriters' Laboratories standard. After considerable experimentation the Underwriters' Laboratories developed emergency specifications under which an adequate but shorter-lived hose could be produced, according to their tests, that would comply with the WPB order.

Science News Letter, July 4, 1942

IN SCIEN

MEDICINE

Spanish Edition Announced Of Annals of Surgery

NEWEST bond between North and South America is the publication, starting with the June issue, of the Annals of Surgery in Spanish. This 57-year-old publication is the official organ of the American Surgical Association and the Southern Surgical Association. The new Spanish edition will be published in Buenos Aires, Argentina, by the Guillermo Kraft Company. The edition in English will continue to be published by J. B. Lippincott Company.

"The policy of the journal has been formulated by a distinguished editorial board representing the medical schools and the national surgical societies of the United States and Canada. In the future," says Dr. Walter Estell Lee, chairman, "this board will sincerely hope to secure the support, inspiration and privilege of consulting members from our sister republics in South America, where surgical work of such a high caliber is being performed."

Science News Letter, July 4, 1942

CHEMISTRY

Plastic Thrust Into Leaks Keeps Lifeboats Afloat

A NEW plastic, after kneading briefly in the hands can be thrust into leaks in a sinking lifeboat to plug holes splintered by bullets. Every lifeboat in the British Merchant Service is now equipped with the pliant substance, according to British information.

The plastic has a binding effect and works by settling and hardening in water. Already officially approved by the British for emergency boat repair, it is expected also to prove useful in pontoons.

American merchant ships have not adopted the plastic. Tapered soft-wood plugs, or bolts with grummets and washers, are supplied for mending leaks; also candle wicking, adhesive tape, and white lead in oil. However, U. S. Coast Guard officials are now experimenting with substances similar to the British plastic.

Science News Letter, July 4, 1942

E FIELDS

ASTRONOMY

Canadian Astronomers Find Lithium in Coolest Stars

LITHIUM, third lightest element, has been identified in at least 19 stars by Drs. A. McKellar and W. H. Stillwell, astronomers at the Dominion Astrophysical Observatory, Victoria, B. C. Their results have been reported to the members of the American Astronomical Society meeting in New Haven.

Hitherto, lithium had been found definitely present in only one star, WZ Cassiopeiae. This is an N-type star, often called "red carbon stars," and one of the coolest known, but there are a few score of other N-type stars which did not appear to contain lithium in their atmospheres.

However, the astronomical chemist is constantly improving his technique, particularly by using spectrographs attached to large reflecting telescopes, such as the 72-inch at Victoria, one of the world's largest instruments. With a grating spectrograph, Drs. McKellar and Stillwell studied the spectra of 19 red carbon stars and detected the presence of lithium in all but one of them.

The existence of lithium in almost all stars is indicated by this work, but their high temperatures prevent its spectral lines from showing.

Science News Letter, July 4, 1942

PHYSICS

Bees Flying In a Hive Do Not Lessen Its Weight

GRASSHOPPERS jumping about in a box do not lessen its weight; neither do bees flying about in a closed hive.

A friend on a farm asked Dr. Gordon S. Fulcher, a physicist of Washington, D. C., if a hive would be easier to carry if she stirred up the bees so they would fly around. This suggested the grasshopper problem to Dr. Fulcher as a similar but simpler case. (*Science*, June 5.)

Each grasshopper as it jumps gives a downward kick to the box, thereby increasing its weight. While the grasshopper is in the air, the box is, to be sure, relieved of its weight, but when the hopper lands, the box again receives a downward thump. Dr. Fulcher shows mathematically that these balance out and the average weight of the box does not change.

The same applies to the bees in a closed hive: "The total average weight must be the same no matter what the actions or motions of the bees and other parts inside the closed container may be."

The same applies to any body not at the absolute zero of temperature, for which all the molecules are at rest. At any higher temperature, because of thermal agitation, many of the molecules at any given instant are in the air, so to speak. But each molecule as it takes off gives a downward kick and again when it lands. The weight of the body as indicated by a balance is an average of these downward kicks and of the dead weight of those molecules that happen to be at rest. The indicated weight does not change with temperature.

Science News Letter, July 4, 1942

MEDICINE

Sulfa Drugs Saving 75% Of Meningitis Patients

THE SULFA drugs are saving 75 out of every 100 patients stricken with influenzal meningitis and about 90 out of every 100 with meningococcus meningitis, according to two surveys reported to the *Journal, American Medical Association* (June 27).

Before the introduction of the sulfa drugs, the mortality from influenzal meningitis was 100% among patients most of whom, 74.6%, were babies and children under 6 years old. When sulfanilamide was used to treat this deadly disease the mortality was reduced a little, to 92.3%, but after sulfapyridine became available, the mortality dropped to 25% among patients. These figures apply to experience at the Los Angeles County Hospital and are reported by Dr. Evelynne G. Knouf of Los Angeles, Dr. William J. Mitchell of Alhambra, Calif., and Dr. Paul M. Hamilton, of San Marino, Calif.

For the other kind of meningitis, sulfa drug treatment saved 98 out of 110 patients, a mortality of 10.9%, at Sydenham Hospital, Baltimore, between January, 1938, and February, 1942, Dr. Horace L. Hodes and Captain Paul S. Strong, U. S. Army report. Sulfathiazole and sulfadiazine, they find, are superior to sulfanilamide in treatment of this kind of meningitis.

Science News Letter, July 4, 1942

PHYSICS

Thin Glass Coatings Protect Plastic Lenses

PLASTIC lenses for cameras, spectacles and other uses can be protected against scratches and other injuries that have been their principal drawback by coating them very thinly with glass films, Frederick J. Binda of Boston points out in his description of a method on which he has just been granted U. S. patent 2,287,546.

Plastic lenses can be made very rapidly and cheaply and would undoubtedly have much wider use than they enjoy at present if they were not so easily scratched. Mr. Binda overcomes this difficulty by blowing a bubble of hard glass in such a way that it comes into contact with one side of the lens. The film of molten glass, which may be as thin as a few ten-thousandths of an inch, cools, hardens and sticks tightly to the lens, giving it a scratch-resistant surface.

Mr. Binda suggests that his method may be used, among other purposes, for protecting plastic sun goggles containing embedded layers of light-polarizing particles—a type of eye protection that has become increasingly popular in the last couple of years. He has assigned his patent rights to the Polaroid Corporation, which manufactures such materials.

Science News Letter, July 4, 1942

ENGINEERING

Comfort in Subway Assured By Electricity

COMFORT and safety of passengers will be provided for in Chicago's new $64,000,000 subway by the most modern electrical equipment, the American Institute of Electrical Engineers was told by Charles E. DeLeuw, of the Chicago Department of Subways and Superhighways.

At almost every station escalators will relieve the strain on weary feet. Eight and ten-foot fans will bring in fresh air. Soft fluorescent light will illuminate the stations and platforms, while incandescent lamps will light the tunnels.

Modern lightweight cars, seating 106 persons and carrying 200, will speed up to 45 miles per hour, smoothly and quietly over welded rails. Only regret is that these new cars will not be ready at the time of the expected opening early in 1943. Temporarily, older cars will have to be used. But congestion will be relieved in downtown Chicago.

Science News Letter, July 4, 1942

ASTRONOMY

Elements Which Refuel Stars Found in Planetary Nebulae

Great Clouds of Gas Surrounding the Very Hot O-Type Stars Composed of Hydrogen, Helium, Carbon, Nitrogen, Oxygen

STAR "shells" are made of the same elements as stars themselves, according to two Harvard astronomers, Dr. D. H. Menzel and L. H. Aller. They find that the planetary nebulae, which are great clouds of gas surrounding the very hot O-type stars, are composed chiefly of hydrogen, helium, carbon, nitrogen and oxygen.

These are the same five elements which play the important role of furnace-men in the sun and most other stars. In the well-established carbon cycle, originally proposed by Dr. Hans Bethe, of Cornell University, hydrogen is the fuel and helium the ash of stars, while carbon, nitrogen and oxygen are the elements which keep the process going.

Dr. Menzel and Mr. Aller obtained their results, reported to the American Astronomical Society, from a study of "enhanced" and "forbidden" lines in the spectra of the planetaries. The new findings confirm the belief of astronomers that the same proportion of elements makes up all things in the universe.

Science News Letter, July 4, 1942

ZOOLOGY

Animal That Is Still Alive Has Produced 21,000 Generations

AN ANIMAL that has produced 21,000 generations of offspring and yet is still alive is celebrating its 35th anniversary in the Osborn Zoological Laboratory of Yale University.

The animal in question is of a race of the microscopic water-dweller known as paramecium or slipper-animalcule. Because this particular race was started on its career of biological immortality by Prof. Lorande Loss Woodruff, it has come to be known as the Woodruff race.

Paramecium is able to reproduce itself indefinitely by simply dividing in two, without any sex process. Each of the two parts rapidly grows again to original size, so that each can claim to be the original individual; also, barring accidents, this continuously dividing-and-multiplying individual never dies. So that we arrive at the paradoxical situation of having millions of microscopic animals, each with as good a claim as any of the others to being the founder of the line, and all of them 21,000 generations old without having experienced death.

Of course, the great majority of the offspring of the Woodruff paramecium race have been discarded and destroyed. If all had been kept, and food enough could have been provided, the race would in the first five years have packed all known space, out to the farthest stars, with a solid mass of paramecia.

This race of microörganisms has passed through 21,000 of its generations in little more than the time reckoned as one human generation. In human terms, 21,000 generations would be 630,000 years—a period going back to the haziest conjectural beginnings of the most primitive prehistoric human beings.

Science News Letter, July 4, 1942

BOTANY

Boron Lack Causes Wild Growth in Plant Cells

ABNORMAL growth of certain cells in plant cells, so sudden as to be almost explosive, is caused when the plant is starved for boron, Prof. Taylor R. Alexander of the University of Miami, Florida, has discovered. The wild growth of some of the cells crowds others aside and disrupts the life processes of the plant.

Prof. Alexander worked with young squash plants. He supplied some of them with the exceedingly minute amounts of boron which plants ordinarily require, but kept others on a mineral-nutrient ration from which boron had been totally excluded.

Abnormal growth must have set in practically at once, for within 48 hours effects began to be visible. First there was a sudden spurt on the part of the cells in growing tips, then they collapsed.

There were many distressing symptoms, but the most marked was a similar spurt of wild growth by pulpy cells (parenchyma) in the stem, producing a great thickening of the stem and so crowding the long fibrous tubes that are the plant's internal transportation system that the movement of foodstuffs was apparently seriously interfered with.

The suddenness and violence of the reaction, to the absence of a mineral salt that ordinarily exists only in a few parts per million of soil solution, suggests a possible use of plants instead of chemical analyses to determine need for this and possibly other plant food elements. This biological test seems to be very much more sensitive than any easily applied chemical method.

Prof. Alexander has reported technical details of his research results to the *Botanical Gazette* (May).

Science News Letter, July 4, 1942

CHEMISTRY

Dehydrated Foods May "Spoil Themselves"

DESPITE their superior resistance to spoilage due to attacks of molds, bacteria and other outside organisms, dehydrated foods sometimes lose quality in storage. They become tough, or develop hay-like "off" tastes and odors. Causes for this were traced to the vegetables' own internal enzyme chemistry by Prof. W. V. Cruess and Prof. M. A. Joslyn of the University of California.

These enzymes are organic catalysts or ferments, necessary to the normal life activities of the plants, but damaging to their quality as foods if permitted to continue activity after harvesting and storing. In vegetables properly prepared for the dehydrator, all such life processes are stopped by steam or hot-water blanching. Profs. Cruess and Joslyn described several chemical tests which they recommended for determining the amount of enzyme activity persisting in dehydrated vegetables.

Science News Letter, July 4, 1942

BOTANY

NATURE RAMBLINGS by Frank Thone

Symbol of Union

INDEPENDENCE Day used to bring a great outburst of oratory in praise of the American Eagle. Perhaps it still does, but nobody listens to a Fourth-of-July orator any more now; it is too easy to turn the dial and shut him off. Anyway, the eagle long ago established his solid claim in American heraldry, and flaps his wings triumphantly on our national currency and seals.

Most nations have a flower as well as a national bird or beast. The United States is one of the few that has never found the plant that best expresses its national spirit and sentiments. Among those that have been proposed, and for which their advocates are still claiming primacy is the goldenrod.

The goldenrod has much to recommend it. Its plumy head is made up of many smaller units, giving botanical point to the national motto: "E Pluribus Unum." It is exceedingly hardy, resisting cold, drought and all kinds of adversity. It grows throughout a wide stretch of our territory; though some states are quite without it, and these are naturally among the most vigorous protestants against goldenrod as a national emblem.

One objection is most unfairly advanced against the goldenrod. Somehow a most persistent and hard-to-kill superstition has arisen that this fine yellow flower is responsible for hay fever. The experiments of numbers of careful and critical medical scientists have failed to show that goldenrod pollen has anything to do with ordinary hay fever. This is caused by non-showy weeds that come into flower during goldenrod season; and thus the goldenrod gets the blame for the mischief these lurkers do.

Science News Letter, July 4, 1942

MEDICINE

Penicillin Stops Germ Growth At Dilution of 1:12,000,000

English Scientists Have Now Obtained Highly Purified Effective Preparation in Form of Its Barium Salt

THE REALLY terrific germ-blitzing power of penicillin, one of medicine's newest weapons against disease germs, appears in a report by Dr. E. P. Abraham and Dr. E. Chain, of the University of Oxford, to *Nature* (March 21).

Penicillin is extracted from a mold not unlike the molds that grow on bread, cheese and sausage. The English scientists report they have now obtained a highly purified preparation of penicillin in form of its barium salt. This preparation is able to stop completely the growth of *Staphylococcus aureus,* the kind of germ that causes boils, carbuncles and the like, in a dilution of one part in 12,000,000.

"Penicillin," they state, "must therefore be regarded as one of the most powerful antibacterial substances with predominantly bacteriostatic action known."

Scientists hope to get a preparation of penicillin so pure that it will form crystals. The job of determining its chemical composition and then, perhaps, of finding a way to manufacture it on a large scale as the sulfa drugs are now produced, will be speeded, once crystal-pure penicillin is obtained.

Penicillin has already, in experimental work with patients, proved a safe and effective weapon to use against germ diseases. Widespread use of it depends on discovery of a way to produce large amounts of it, either from the mold itself or by chemical means. It was discovered by Prof. A. Fleming of St. Mary's Hospital, London.

Science News Letter, July 4, 1942

New Germ Remedy

FROM a different kind of mold, *Aspergillus clavatus,* Dr. B. P. Wiesner, of the Royal Northern Hospital, London, reports in *Nature* he has discovered still another potent germ remedy.

Small quantities of this substance stop the growth of *Staphylococcus aureus,* while larger quantities kill these germs within a few hours in test tube experiments.

Active concentrates were given without harm to mice, to healthy human subjects and to patients. This newest germ-killer from germs has not been known long enough for much study on its ability to protect humans against germs, but already it has shown it can check germs that resisted some of the sulfa drugs and mandelic acid. It has the advantage of exerting its anti-germ power in the presence of blood serum, pus and urine.

Science News Letter, July 4, 1942

MILITARY SCIENCE

Color Guard in Review Depict Spirit of 1942

See Front Cover

THE ILLUSTRATION on the front cover of this week's SCIENCE NEWS LETTER is an official photograph from the War Department. It shows our colors passing in review at an outpost "somewhere" where America's soldiers are now ready to do battle to preserve the liberties of which July 4 reminds us.

Science News Letter, July 4, 1942

Sugar shortage will step up Canadian honey business this year, and the Canadian National Express already has reservations to transport 100,000,000 bees; most of which come from Georgia and Mississippi.

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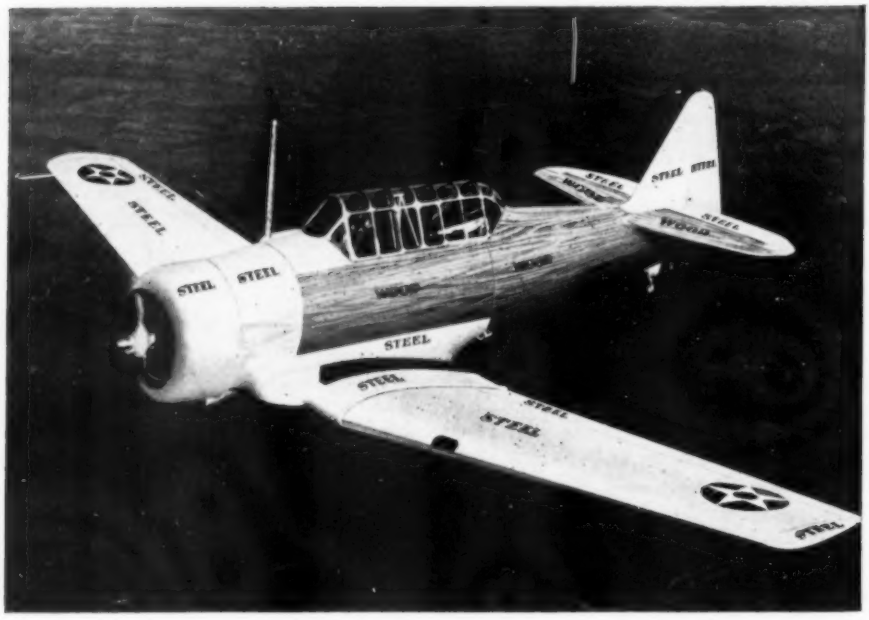


SUBSTITUTES

On this actual photograph of a North American AT-6A trainer in flight, the artist has marked off sections to illustrate assemblies built of steel and wood.

INVENTION

Better Inventions Aid U. S.; Hush-Hush Part of Planning

National Inventors Council Is Not Announcing Percentage of Ideas Adopted But It Tops Past Record

BETTER inventions, better planning for their use, is the summed-up verdict as to whether this World War finds the United States mobilizing its famed inventive power more effectively than in World War I.

The hush-hush of secrecy rolls up like a barrage around this subject of defense inventions. That is part of the better planning.

Outstandingly important is the National Inventors Council, which is not merely sitting back waiting for inventions to drift in. The Council has actively asked inventors who have brainchild devices of possible defense and war value to send them in, for the good of the country. And this time, the Government's advisers who sift inventions for an emergency are not trying to do inventing and research themselves, as an organization. Instead, they depend on American inventors, everywhere. Thus far, some 30,000 inventions and suggestions have been offered. But don't ask details about what has proved valuable. That is information which goes on to the War or Navy Departments or other defense agencies that may be aided.

The low batting average of the inventing public in the first World War taught war agencies that they cannot expect amazing new war weapons to come in the mail by the dozen. Out of 110,000 inventions offered to the Naval Consulting Board in that war, all but 110 were rated worthless to the country on first examination. Eventually just one invention was used—a mechanism for testing airsickness in pilots. The War Department got 25,000 inventions, and found 25 worth serious attention. The burden of giving the nation new and improved war and industrial gear fell on research workers who had been working on this type of specialized problem. Still—there is always the chance that small or large inventions of national value may pop up from unexpected sources.

Officials of the National Inventors Council are not announcing the percentage of new ideas being adopted by the armed services, but it is no secret that the present record has more than topped already the accomplishment during the past war.

Meanwhile, legal safeguards have been tightened to prevent defense inventions from leaking or reaching unauthorized foreign destinations. When this war broke out, any one could buy a copy of any United States patent and read the details for ten cents.

Now, patent officials say: "We are deliberately making things secret." For more than a year the law has authorized the Commissioner of Patents to withhold from publication and preserve in secrecy any application which would affect public safety. Inventors with such valuable applications on file are warned to keep the secrecy—or else.

The penalty for violating secrecy is a $10,000 fine and two years in jail. Thus far there have been no convictions.

A similar penalty was clamped down, September 20 of last year, on any person who makes an invention in this country and files an application to patent it abroad, without getting a license to do so from the Commissioner of Patents.

Are Americans inventing for war? "Yes," says a patent official. "There is an increased interest in war inventions, and more patent applications on such subjects are filed now than in times of peace."

And what about foreign patents in this country? Can the United States Government use what German or other foreign inventors have tried to tie up by patent safeguards in our country? The answer is terse:

"Patents cannot interfere with the United States Government."

If there is an invention patented in this country by an American or a foreigner, which will aid the country now, that invention is at the disposal of the Government. Legally, no one can enjoin the United States from using any invention at any time. The inventor has exactly one recourse—he may go to the Court of Claims, and there he will be awarded reasonable compensation, if the Court finds it just. Meanwhile, the United States has used the needed invention when it needed it.

Science News Letter, July 4, 1942

China's ***Burma road*** was a migration route for animals and plants at the dawn of human civilization.

HISTORY

Jap Totalitarianism Is Not Copied From the Nazis

JAPANESE totalitarian nationalism has its psychological and historic roots in the remote past of its present enemy, China, and is not copied from the modern Fascism of Germany and Italy as frequently assumed, the Harvard Institute on War Problems meeting was told by Edwin O. Reischauer of the Harvard University faculty.

Ancient China, the speaker said, was a totalitarian state with an absolute emperor. The country never had a Magna Carta or a Bill of Rights; the idea simply did not occur to anyone. The idea of the empire was carried to Japan soon after the beginning of our era, along with almost all other elements of Japanese civilization. Prior to that time Japan had been a mass of warring petty feudal states, like Europe in the dark ages.

However, the Chinese absolutism was never militaristic. It was built around a civil-service bureaucracy. The Japanese added the idealization of war and the worship of the warrior out of their own primitive feudal background to create their own brand of medieval totalitarianism.

Recognizing China as the source of all their culture, the Japanese developed an inferiority feeling toward the great mainland country, Mr. Reischauer continued. They tried to escape from this in the sixteenth century by conquering China and assuming its place of leadership, but they failed.

This national inferiority complex cropped up in Japan again in the nineteenth century, this time directed toward Occidental culture, and the reaction has been quite similar—an effort to assert superiority by force of arms where they feel inferiority and indebtedness in the matter of culture.

Science News Letter, July 4, 1942

Japan Unlike China

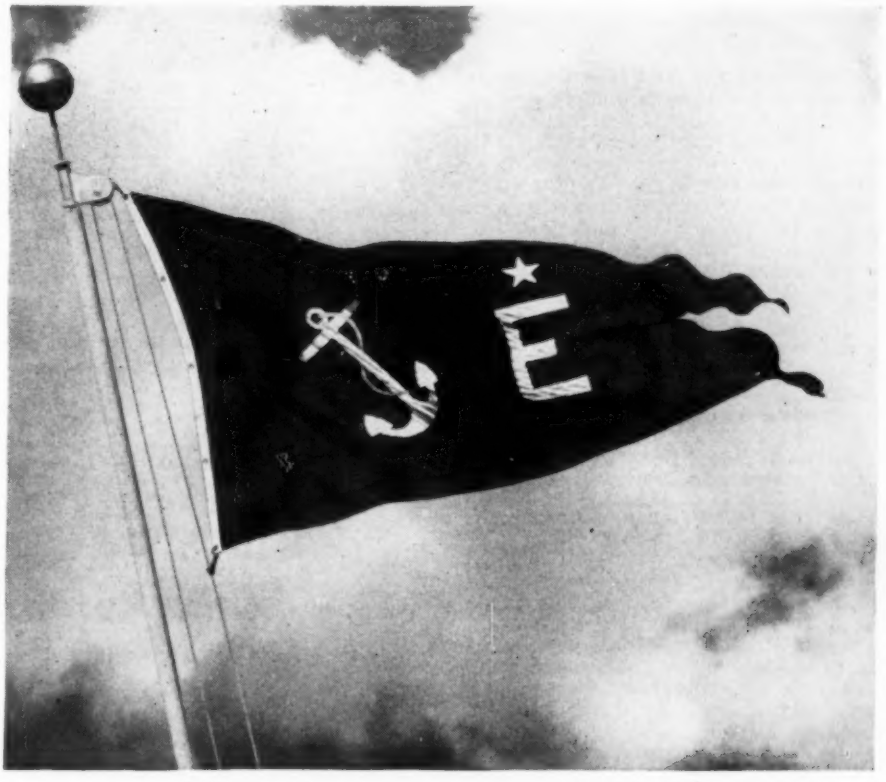
DR. George E. Taylor, who spoke at the same session, stressed the historic dissimilarity between Chinese and Japanese. "There is less likeness between the two nations," he said, "than there is between Germany and France."

In general, he asserted, it is "historical rubbish" to speak of "Orientals" as if they were all alike. There is no more uniformity among peoples in the Orient than there is in the Occident. Like peoples in the West, Orientals have a tendency to rally to proven leadership. China is supplying such leadership in the struggle to prevent Japanese hegemony from becoming the successor to European capitalist imperialism and may well become the rallying point for the real new order in Asia.

It will be worth America's while, he declared, to pay any reasonable political price for the continued friendship and support of China.

Science News Letter, July 4, 1942

Deaths from *scarlet fever* have dropped more than 80% since 1900.



A New Star over America

THIS is the new All-Navy "E" burgee. With its added star, it signifies that, for a period of over six months, production of Navy material has been apace of schedule. First flown in America over the Bausch & Lomb plant, it is official Navy recognition to B&L workers of their continued achievement in Production for Victory. It replaces the Bureau of Ordnance flag and "E" pennant awarded Bausch & Lomb July 25, 1941.

The Navy "E" has always been an honor to be striven for, to be guarded jealously. On gun turret, battleship funnel, or the flagstaff of an industrial plant, it is a symbol of championship performance. But today, Navy officials—and the American public—are anxious to see this award in as many places as possible. Because "championship performance" is what America needs today—all down the line.

Workmen at Bausch & Lomb are devoting to the specific implements of war, the experience and skills gained in the production of scientific optical instruments. Today the world depends on America's men-behind-the-men-behind-the-guns to destroy the forces of aggression—that the ideals of individual freedom may survive.

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New Machines And Gadgets

Novel Things for Wartime Living

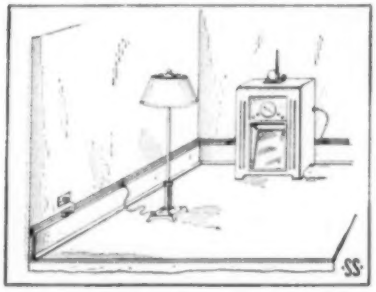
Self-lubricating iron bearings, in place of bronze, save copper and time and attention in oiling small machines and appliances. The bearings are porous, being made of powdered iron, molded to shape and baked and then saturated with oil. Usually the oil reserve lasts the lifetime of the appliance, but for heavy duty or continuous running some additional oil may be required.

Fluorescent material for blackouts can now be had in rolls or by the yard. By daylight it just looks like a good oilcloth. But after exposure to daylight, to black light, or to intense artificial light, it will shine in the dark for many hours. It can be cut out in the form of letters, arrows or lines and pasted or tacked up where desired, or can be sewed to curtains, clothes or other fabrics.

Airplane carburetors have been improved by a new diaphragm composed of a cotton cloth impregnated with synthetic elastic materials. The diaphragm is accurate in dimensions and of a uniform thickness of one-thousandth of an inch. The material is used also for oil seals, valve seats, gaskets, etc.

Concrete forms made of paper are an innovation to speed building construction especially where, as in large cantonments, foundations must be set for many piers and posts. The forms are cylindrical and built up of spirally wound laminated paper just like a mailing tube. They save the time and waste of setting up and taking down wooden forms. After the concrete has set, the paper may be removed with a special tool or it may be allowed simply to disintegrate.

A convenience outlet that really is convenient is shown in the illustration. It extends the one or two outlets the builder has meagerly provided to a continuous strip that may go all around the room, and current taken off at any



point. The live wires are well buried in recesses under overlying insulating strips and can only be reached by the specially shaped prongs of the movable plug. This invention has just been patented.

Phantom-proof traffic lights are a recent development. A visor above the lamp prevents the direct rays of the sun from striking the lens, giving the appearance the lamp is lighted when it isn't. This is called the "Sun Phantom." The new lamp has also a silvered glass reflector in place of the usual metallic reflector.

For patching cement floors in which cracks, holes or ruts have appeared, a new quick-hardening cement has been developed. It hardens overnight and becomes stronger with age. Because of an iron ingredient, it is especially resistant to wear.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington, D. C., and ask for Gadget Bulletin 111.*

Science News Letter, July 4, 1942

SCIENCE CLUBS OF AMERICA

Sponsored by Science Service

NEWS OF CLUBS

WILLIAMSBURG, Va.—Nine years ago Carl Gottschalk started a collection of butterflies while but a freshman at high school. Although he has neither bought nor sold specimens his present collection comprises more than 4,000 different butterflies and includes several hundred different species, many of which are rare and valuable. His reputation as a scientist and authority on butterflies has grown along with his collection which includes rare species from Japan, Germany, Italy, Holland, Latvia, Turkey, Greece, Brazil, Peru, Canada, Switzerland and many other countries.

This absorbing collection of butterflies was exhibited at the Second Annual Convention of the Virginia Junior Academy of Science at Hotel Roanoke, Roanoke, Va. Its exhibitor, now a senior in college, will become a medical student on graduation next month. This shows how far a scientific hobby can be promoted.

The theme of the convention was "Science in National Defense". Science club exhibits set up by Junior Academy members, were viewed with interest as was a special model airplane exhibit set up by the Jefferson Senior High School and a Fisheries exhibit presented by the Virginia Fisheries Laboratory of the College of William and Mary and the Commission of Fisheries.

INDIANAPOLIS, Ind.—Lectures on the application of physical principles to professional and industrial activities are of major interest to members of the Physics Club at Arsenal Technical Schools. This club holds two science congresses and a science fair annually and participates in the annual program of the Indiana Junior Academy of Science. Then, too, there are joint programs with science clubs of other local schools. Something doing every moment seems to be the general plan. The sponsor is Ersie S. Martin, physics teacher.

LAKEVILLE, Conn.—Two or three social meetings with games, songs, and refreshments add sparkle to the activities of the Hotchkiss Chemistry-Physics Club at Hotchkiss School, Lakeville, Conn. At this school one will find photography, medical, weather bureau and railroad clubs, all of which are affiliated through the school's treasury. Demonstrational lectures are delivered to them by students or outside speakers. Individual projects are built and occasional exhibits are arranged. Field trips and science movies round out the busy program. This club is sponsored by William N. Stakely, chemistry instructor.

Clubs are invited to become affiliated with SCA for a nominal $2 for 20 members or less. You can become an associate of SCA for 25 cents. Address: Science Clubs of America, 1719 N St., N.W., Washington, D. C.

Science News Letter, July 4, 1942

AERONAUTICS

Plastics for Airplanes Get New "Mar" Test

A NEW "mar" test has been devised to indicate how well the transparent plastics used for the gun turrets, nose pieces and windows of our airplanes will resist dulling effects of dust, smoke and sand blown against them with great force. The ordinary scratch and hardness tests have been found unreliable indicators of this effect.

The new test, which is much more direct, was described by Ladislav Boor, physicist of the Stamford Research Lab-

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oratories of the American Cyanamid Company, at the meeting of the American Society for Testing Materials in Atlantic City.

The test consists in allowing a stream of finely divided carborundum to fall from a height of 25 inches on the test piece, which is inclined at an angle. A definite amount of the abrasive is allowed to fall, producing a dulled spot. The loss of gloss as compared with the original gloss is then measured with a glossmeter. This is an instrument used to measure glossiness of paint and of other surfaces.

Several materials were tested in this way giving ratings quite different from those obtained by the scratch and hardness tests, but no one final method was decided upon. However, the "mar" test will undoubtedly help in keeping visibility clear for our air-fighters.

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● RADIO

Saturday, July 11, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Steuart H. Britt, director of the National Research Council's Office for Psychological Personnel, will discuss "Psychologists in the War."

Tuesday, July 7, 7:30 p.m., EWT

Science Clubs of America programs over WRUL, Boston, on 6.04, 9.70 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in the high chuols, throughout the Americas. Have your science group listen in at this time.

POPULATION

Long-Range Bomber May Bring Population Increase

Threat of Air Attack May Do Away With Large Apartment Houses and Crowded Living in Big Cities

THE BIG long-range bomber which has killed so many civilian fathers, mothers, and little children in this new kind of war may have a part in increasing the number of babies in tomorrow's world.

This prophecy is implied in an analysis of what modern warfare will do to the location of industries and workers presented to the Population Association of America by Dr. Warren S. Thompson, of Miami University.

As long as the threat of attack from the air hangs over the heads of the people, military considerations will dominate all policies influencing the distribution of the people, Dr. Thompson predicted at the Association's meeting in Atlantic City.

The threat of the bomber will very likely do away with the large apartment house which will be replaced by smaller apartment houses with larger open spaces about them and by detached houses — pleasanter places for children to live and grow up.

New factories are likely to be located in outlying regions away from big cities —more healthful places in which to live and grow old even when the bomber is not a constant menace.

When the Soviet Union undertook its first five-year plan, military considerations played a large part in determining where new industrial areas were to be established, Dr. Thompson said.

"In the summer of 1930 I travelled rather extensively in the Soviet Union," he said, "and from many sources I heard that the danger of invasion from the West was the dominant factor in locating so many of the new industrial cities along the Volga and in the Urals. There was not the least hesitation anywhere in avowing this motive. Today we appreciate the foresight shown in this planned distribution of industry."

However, the new Soviet cities were not themselves decentralized nor were the factories built in small units less vulnerable to crippling damage from air bombardment, Dr. Thompson pointed cut. The Russians relied, rather, on distance to insure the safety of their new factories.

More recently, Germany has gone farther. In population figures, the secret location of new war industries in small cities and rural areas can be detected, since those areas are growing faster than are the big German cities.

Rumors also point to the fact that Germany has decentralized the industrial centers. This means the spreading out of population, too. The area covered by larger cities will be increased and businesses which have been tightly packed together in downtown areas will be scattered.

Countries like Russia, America and China can place more reliance on distance rather than decentralization for safety. Germany, Italy, France and Great Britain cannot.

Such policies, intended to protect war production, inevitably have an indirect effect on the lives and happenings of the people—an effect which incidentally is favorable to democracy and unfavorable to dictatorships.

Privacy for the family and for individual members of the family in any one home is one of the important elements in the American way of life, Dr. Thompson declared.

"It is one of the fundamental differences between the American social structure and the totalitarian. The leaders in the dictatorship do not want the masses of the people to have any private life. They want them to live intimately with other people, to live merely as a cell in the national organism. It may very well be that our marked individualism, particularly among farm people, is in part the result of the type of land settlement which predominated in this country until near the end of the nineteenth century, but the crowding together of greater and greater masses of people in cities and the crowding of the majority of families into one, two or three rooms cannot be looked upon with equanimity by one who still believes that people are entitled to a certain measure of privacy both as families and as individuals."

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LEARN SPANISH
THE LANGUAGE OF TOMORROW'S BUSINESS
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It's easy to learn to speak, read and write Spanish this popular new way... and it takes only ⅓ of the time usually required to master a foreign language. Play Solitaire or play the Course with a member of your family or while you entertain friends. Prepares for the thousands of post-war opportunities that will be available to Spanish-speaking men and women when trade with our Latin-American neighbors is at its peak. Remember... 2, 3 or 4 persons can learn at no extra cost. 4 decks of cards and Cloth-Bound Text Book, only $2 postpaid.
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First Glances at New Books

WAR

MACARTHUR ON WAR—Frank C. Waldrop, ed.—*Duell, Sloan and Pearce,* 419 p., $3. Selections from the writings of Douglas MacArthur, principally from his official reports, which demonstrate a grasp of military theory and history that impressively supplements the brilliant record he has achieved as a field officer.

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MEDICINE

RABIES—Leslie T. Webster—*Macmillan,* 168 p., $1.75. The facts about rabies and its control are presented clearly and in terms simple enough for any intelligent layman to understand. Dog owners, veterinarians, public health officials and physicians will all find this a useful book.

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PHOTOGRAPHY

FAIR IS OUR LAND—Samuel Chamberlain, designer and ed.—*Hastings House,* 252 p., illus., $5. Anyone who loves America or who delights in beautiful pictures will find joy in this volume of photographs, engravings and etchings.

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POLITICAL SCIENCE

THE PRICE OF FREE WORLD VICTORY—Henry A. Wallace—*Fischer,* 32 p., 75c. The text of the Vice President's recent notable speech on our war aims, together with comments by Raymond Clapper, Maj. George Fielding Eliot and other newspaper and radio notables. This is "must" reading for all fighters for freedom.

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ZOOLOGY

VOLES, MICE AND LEMMINGS, Problems in Population Dynamics—Charles Elton—*Oxford Univ. Press,* 496 p., $10. A searching examination of the biological backgrounds of the periodic upsurges in small-mammal populations that result in dramatic mass migrations, increases in fur catches and other phenomena that get into the news. This book opens up new vistas in animal ecology.

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CHEMISTRY

LIVING CHEMISTRY — Maurice R. Ahrens, Norris F. Bush and Ray K. Easley—*Ginn,* 545 p., illus., $2.28. By diligent inquiry over a period of twelve years among high school pupils as to what problems in chemistry most interested them, what questions they most wanted answered, the authors have composed a text designed with the help of attractive illustrations to arouse a real interest in the subject among young people. Many unusual things are discussed, from the cause of baldness to the vitamins contained in foods.

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METEOROLOGY

WEATHER ELEMENTS, A Text in Elementary Meteorology (rev. ed.)—Thomas A. Blair—*Prentice-Hall,* 401 p., illus., Trade $5, School, $4.

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Just Off the Press

BABIES ARE FUN—Jean Littlejohn Aaberg—*Wm. Penn Pub. Corp.,* 128 p., illus., $1.

THE COPYRIGHT LAW, An Analysis of the Law of the United States Governing Registration and Protection of Copyright Works, Including Prints and Labels — Herbert A. Howell — *Bureau of National Affairs,* 280 p., $5.

FAIR IS OUR LAND—Samuel Chamberlain, designer and ed.—*Hastings House,* 252 p., illus., $5.

FIGHTING FLEETS—Critchell Rimington—*Dodd, Mead,* 240 p., illus., $3.

HOME PORK PRODUCTION — John Smedley — *Orange Judd,* 134 p., illus., $1.50.

AN INTRODUCTION TO THE PLANT SCIENCES —William C. Darrah—*Wiley,* 332 p., illus., $2.75.

JAPAN AND THE OPIUM MENACE—Frederick T. Merrill—*Institute of Pacific Relations and Foreign Policy Assn.,* 170 p., $1.50.

LIEBIG AND AFTER LIEBIG, A Century of Progress in Agricultural Chemistry—Forest Ray Moulton, ed.—*American Association for the Advancement of Science,* 111 p., $3.

MAKING THE MOST OF YOUR PERSONALITY —Winifred V. Richmond—*Farrar & Rinehart,* 247 p., $1.75.

POSSIBLE ALTERNATES FOR NICKEL, CHROMIUM AND CHROMIUM-NICKEL CONSTRUCTIONAL ALLOY STEELS—*American Iron and Steel Institute,* 143 p., 50c.

THE POST-WAR INDUSTRIALIZATION OF CHINA —H. D. Fong—*National Planning Assn.,* 92 p., 50c.

THE PRICE OF FREE WORLD VICTORY—Henry A. Wallace—*Fischer,* 32 p., 75c.

PRINCIPLES OF APPLIED PSYCHOLOGY — A. T. Poffenberger—*Appleton-Century,* 655 p., $4.

RADIUM TREASURE AND THE CURIES—Irmengarde Eberle—*Crowell,* 105 p., illus., $2.

THE SCIENCE OF HEALTH—Florence L. Meredith—*Blakiston,* 427 p., illus., $2.50.

SEX FULFILLMENT IN MARRIAGE — Ernest R. Groves, Gladys Hoagland Groves and Catherine Groves—*Emerson Books,* 319 p., $3.

TECHNIDATA, Handbook—Edward Lupton Page —*Henley,* 64 p., $1 spiral binding; $1.50 cloth.

VISUAL MECHANISMS—Heinrich Kluver, ed.—*Cattell Press,* 322 p., illus., $3.25. (Biological Symposia, Vol. VII).

YOUR CAR IS MADE TO LAST—Herman Bishop and Bergen Evans—*Putnam,* 186 p., $1.50.

PSYCHOLOGY

MAKING THE MOST OF YOUR PERSONALITY—Winifred V. Richmond—*Farrar & Rinehart,* 247 p., $1.75. A rare book about boys and girls of high school age. Rare — because it is written for the young people themselves and not solely for parents or teachers. It discusses just the questions in which those approaching manhood or womanhood are most interested, as indicated by the requests and suggestions of high school boys and girls. The author is psychologist at St. Elizabeths Hospital in Washington, D. C.

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PHYSICS

THE "PARTICLES" OF MODERN PHYSICS —J. D. Stranathan—*Blakiston,* 571 p., illus., $4. An excellent survey of the whole field of atomic physics, particularly emphasizing the experimental evidence for the existence of the "particles" and the manner in which the modern concepts of physics have been built up.

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CHEMISTRY

NEW PRACTICAL CHEMISTRY AS APPLIED TO MODERN LIFE (rev. ed.)—Newton Henry Black and James Bryant Conant—*Macmillan,* 683 p., illus., $2.20. Emphasis is laid on the relation between chemistry and social welfare and progress. A treatment of the element, its properties and compounds, is followed by a discussion of everyday uses.

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NAVAL SCIENCE

FIGHTING FLEETS — Critchell Rimington — *Dodd, Mead,* 240 p., illus., $3. Ships of all navies, from battleships to mosquito craft, pictured and compared, class by class: a chapter for each type of ship. There are also chapters on aircraft of the U. S. Navy, listings of all vessels in the American navy, and listings of war losses of all navies to date.

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CIVILIAN DEFENSE

TRAINING MANUAL FOR AUXILIARY FIREMEN—Horatio Bond, W. Fred Heisler and R. J. Douglas, eds. — *National Fire Protection Assn.,* 406 p., $1.50. Methods and materials needed for saving our cities when/if Axis bombers drop incendiaries on us. Not only the organized ARP, but all householders and businessmen, can profitably study this book.

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